

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strike through~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered). Please CANCEL claims 3, 17, and 18, AMEND claim 1, and ADD claims 49-52 in accordance with the following:

1. (Currently Amended) A machine component monitoring system monitoring machine components used in a machine system, a plurality of said machine components each having rolling elements, said machine component monitoring system comprising:
 - a control unit;
 - a plurality of determining units, electrically connected, respectively, with a plurality of sensors, said determining units being electrically connected with the control unit, each of the sensors being arranged on the respective machine component and detecting an influence signal induced in the machine component and resulting from passage of the rolling elements, each of the determining units determining, according to a predetermined process set-up condition, a status of the respective machine component, said status being at least one of presence of an abnormality, absence of an abnormality, and lifetime of the respective machine component, in reference to an output signal from the respective sensor; and
 - said control unit collecting results of determination performed by each of the determining units,
 - wherein when determining the status, each determining unit determines one of a presence of an abnormality and an absence of an abnormality in a sensor waveform, which is the output signal from the associated sensor, and
 - each of the determining units determines whether a defect signal component contained in the sensor waveform deviates from a predefined range, and in the event that the defect signal has been determined as deviating from the predefined range, determines the presence of a defect waveform abnormality as the abnormality in the sensor waveform.

2. (Cancelled)

3. (Cancelled)

4. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units compares sensor waveform main signal cycles of the plural sensors connected therewith, and in the event that the main signal cycle is not found within a predefined range, determines the presence of a rotation abnormality as the abnormality in the sensor waveform.

5. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units detects one of a presence and an absence of a determiner abnormality, which is an abnormality resulting from the respective determining unit itself, and a sensor waveform abnormality resulting from the sensor waveform.

6. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein the control unit makes a transmission request sequentially to the determining units, and each of the determining units transmits a result of determination to the control unit in response to the transmission request.

7. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein the control unit commands setting and changing of the process set-up condition for each of the determining units, and each of the determining units changes the process set-up condition according to the command from the control unit.

8. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units has a plurality of waveform processing units processing the sensor waveform according to different waveform processing techniques, and selects one of the waveform processing units that is to be used for processing the sensor waveform, and the control unit applies a selection command necessary to select one of the waveform processing units for the particular determining unit.

9. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units has a plurality of waveform processing units processing the sensor waveform according to different waveform processing techniques, and selects one of the waveform processing units for each of the sensors.

10. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein wiring used to connect the determining units and the associated sensors is a sheathed sensor cable having a sheath that is water proof, dust proof, rust proof, and moisture proof, and resists oil, heat, and electromagnetic noise.

11. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units has a relay terminal, and the determining units are sequentially wired together through the respective relay terminals.

12. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein the machine system is an aggregation of a plurality of machine system constituent elements, each including the plural machine components, and wherein each of the determining units is used one for each of the machine system constituent elements and the sensor connected with each of the determining units is arranged on the machine component provided in one of the machine system constituent elements that is associated with such determining unit.

13. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein the control unit has an automatic monitoring mode and a terminal operated mode, wherein in the automatic monitoring mode, a result of determination performed by each of the determining units is acquired by sequentially issuing a transmission request to request the respective determining unit to send the result of determination, and in the terminal operated mode, when a transmission request is made to request the respective determining unit to send the result of determination and information other than the result of determination, a response thereto is acquired.

14. (Previously Presented) The machine component monitoring system as claimed in claim 1, wherein each of the determining units captures as digital data, the sensor waveform which is the output signal from each of the sensors connected therewith, and the control unit includes a waveform data storage unit storing the sensor waveform that is the digital data captured by each of the determining units.

15. (Previously Presented) The machine component monitoring system as claimed in claim 1, further comprising a maintenance information generating unit generating predetermined maintenance information associated with the machine component, based on a result of determination performed by each of the determining units.

16. (Previously Presented) The machine component monitoring system as claimed in claim 1, further comprising an information processing unit positioned at a location remote from the control unit and connected with the control unit through a communication network, and wherein the control unit collects not only a result of determination performed by each of the determining units, but also a sensor waveform inputted to each determining unit, said information processing unit including a remote data collecting unit collecting the result of determination and the sensor waveform that the control unit has collected from each of the determining units.

17. (Cancelled)

18. (Cancelled)

19. (Previously Presented) A machine component monitoring and diagnosing system monitoring and diagnosing a machine component having rolling elements, which system comprises:

a sensor detecting a factor associated with a lifetime of a machine component incorporated in a machine used at a business establishment of a client corporation;

a sensor information transmitting unit transmitting at least one of information detected by the sensor and information processed with such detected information to a line;

a sensor information receiving unit installed at a business establishment of a manufacturing and selling corporation, which manufactures and sells the machine component, receiving the sensor information transmitted through the line;

a diagnosing unit diagnosing a state of the lifetime of the machine component in reference to the sensor information received by the sensor information receiving unit;

a diagnosis result information transmitting unit transmitting diagnosis result information from the diagnosing unit to the line; and

a diagnosis result information receiving unit installed at the business establishment of the client corporation receiving the diagnosis result information transmitted through the line,

wherein the diagnosing unit includes an examining section to automatically determine, when the sensor information is inputted, whether at least the machine component is properly usable, and a manual diagnosing section to at least one of add a result of diagnosis performed by a person to the result of diagnosis performed by the examining section, and modify the result of diagnosis performed by the examining section based on the result of diagnosis performed by the person.

20. (Previously Presented) A machine component monitoring and diagnosing system monitoring and diagnosing a machine component having rolling elements, which system comprises:

a sensor information receiving unit installed at a business establishment of a manufacturing and selling corporation manufacturing and selling the machine component, receiving through a line information detected by a sensor detecting a factor associated with a lifetime of the machine component incorporated in a machine used by a client corporation located at a remote place;

a diagnosing unit diagnosing a state of the lifetime of the machine component in reference to the sensor information received by the sensor information receiving unit; and

a diagnosis result information transmitting unit transmitting information on a result of diagnosis by the diagnosing unit to the line,

. wherein the diagnosing unit includes an examining section to automatically determine, when the sensor information is inputted, whether at least the machine component is properly usable, and a manual diagnosing section to at least one of add a result of diagnosis performed by a person to the result of diagnosis performed by the examining section, and modify the result of diagnosis performed by the examining section based on the result of diagnosis performed by the person.

21. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the sensor information transmitting unit includes an information collecting section collecting the information detected by each of sensors, the sensors being provided one for each of a plurality of machine components, and an information transmitting section transmitting the information, collected by the information collecting section, to the line.

22. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the diagnosis result information from the diagnosing unit includes a result of determination of whether the machine component is properly usable, and a result of determination of an available term of use if the machine component has been determined properly usable.

23. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the sensor detects at least one of vibration waveform, temperature, and image.

24. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the diagnosing unit utilizes a database for diagnosis, in which specifications for each type of the machine components and examples of diagnosis are registered.

25. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the diagnosing unit utilizes a database for diagnosis, in which environments of use of the machine components are registered.

26. (Cancelled)

27. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein each of the sensor information transmitting unit and the sensor information receiving unit performs a bi-directional communication, and the sensor information transmitting unit transmits the sensor information in response to a request signal from the sensor information receiving unit.

28. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the sensor information transmitting unit transmits the sensor information on a regular basis and transmits the sensor information even when a predetermined abnormality signal is received.

29. (Previously Presented) The machine component monitoring and diagnosing system as claimed in claim 19, wherein the machine in the business establishment of the client corporation has a shaft, and wherein the machine component to be detected by the sensor is a bearing supporting the shaft, said sensor information transmitting unit transmitting sensor information on the bearing to the line.

30. (Previously Presented) A machine component monitoring, diagnosing, and selling system, which comprises:

a sensor detecting a factor associated with a lifetime of a machine component incorporated in a machine used at a business establishment of a client corporation;

a sensor information transmitting unit transmitting at least one of information detected by the sensor and information processed with such detected information to a line;

a sensor information receiving unit installed at a business establishment of a manufacturing and selling corporation, which manufactures and sells the machine component, receiving the sensor information transmitted through the line;

a diagnosing unit diagnosing a state of the lifetime of the machine component in reference to the sensor information received by the sensor information receiving unit;

a merchandise information adding unit generating merchandise information associated with the diagnosed machine component in accordance with diagnosis result information of the diagnosing unit and adding this merchandise information to the diagnosis result information;

a diagnosis result information transmitting unit transmitting to the line merchandise information added diagnosis result information, which is the diagnosis result information added with the merchandise information; and

a diagnosis result information receiving unit installed at the business establishment of the client corporation and receiving the merchandise information added diagnosis result information transmitted through the line.

31. (Previously Presented) A machine component monitoring, diagnosing, and selling system monitoring, diagnosing, and selling a machine component having rolling elements, which system comprises:

a sensor information receiving unit installed at a business establishment of a manufacturing and selling corporation, which manufactures and sells the machine component, receiving through a line information detected by a sensor detecting a factor associated with lifetime of a machine component incorporated in a machine used at a business establishment of a client corporation at a remote location;

a diagnosing unit diagnosing a state of the lifetime of the machine component in reference to the sensor information received by the sensor information receiving unit;

a merchandise information adding unit generating merchandise information associated with the diagnosed machine component in accordance with diagnosis result information of the diagnosing unit and adding this merchandise information to the diagnosis result information; and

a diagnosis result information transmitting unit transmitting to the line merchandise information added diagnosis result information, which is the diagnosis result information added with the merchandise information.

32. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the merchandise information added by the merchandise information adding unit includes price information and delivery date information.

33. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the merchandise information added by the merchandise information adding unit includes information asking about a will to order, wherein the diagnosis result information transmitting unit includes information asking about the will to order in the merchandise information added diagnosis result information, and wherein the diagnosis result information transmitting unit is capable of conducting a bi-directional communication and capable of receiving agreement information with respect to the information asking about the will to order contained in the merchandise information added diagnosis result information.

34. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 33, further comprising an order processing unit generating arrangement information of delivery of the machine component according to contents ordered in the agreement information that is received by the diagnosis result information transmitting unit.

35. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 34, further comprising an electronic decision making unit making a decision according to electronic information in accordance with contents of the order contained in the agreement information received by the diagnosis result information transmitting unit.

36. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, further comprising a diagnosis result utilizing production planning support unit utilizing the diagnosis result of the diagnosing unit in planning a production of the machine component.

37. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the sensor information transmitting unit includes an information collecting section collecting the information detected by each of sensors, the sensors being provided one for each of a plurality of machine components, and an information transmitting section transmitting the information, collected by the information collecting section, to the line.

38. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the diagnosis result information from the diagnosing unit includes a result of determination of whether the machine component is properly usable and a result of determination of an available term of use, if the machine component has been determined properly usable.

39. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the sensor detects at least one of vibration waveform, temperature, and image.

40. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the diagnosing unit utilizes for diagnosis a database in which specifications for each type of the machine components and examples of diagnosis are registered.

41. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the diagnosing unit utilizes for diagnosis a database in which environments of use of the machine components are registered.

42. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the diagnosing unit includes an examining section to automatically determine, when the sensor information is inputted, whether at least the machine component is properly usable, and a manual diagnosing section to at least one of add a result of diagnosis performed by a person to the result of diagnosis performed by the examining section, and modify the result of diagnosis performed by the examining section based on the result of diagnosis performed by the person.

43. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein each of the sensor information transmitting unit and the sensor information receiving unit is capable of performing a bi-directional communication, and the sensor information transmitting unit transmits the sensor information in response to a request signal from the sensor information receiving unit.

44. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the sensor information transmitting unit transmits the sensor information on a regular basis and transmits the sensor information even when a predetermined abnormality signal is received.

45. (Previously Presented) The machine component monitoring, diagnosing, and selling system as claimed in claim 30, wherein the machine in the business establishment of the client corporation has a shaft, and wherein the machine component to be detected by the sensor is a bearing supporting the shaft, said sensor information transmitting unit transmitting sensor information on the bearing to the line.

46. (Previously Presented) A machine component monitoring and diagnosing method monitoring and diagnosing a machine component having rolling elements through a computer network, which method comprises, at a business establishment of a corporation manufacturing and selling the machine component:

receiving through a line, information detected by a sensor detecting a factor associated with a lifetime of the machine component, incorporated in a machine used by a client corporation at a remote location;

diagnosing a status of lifetime of the machine component based on the received sensor information by using an examining section and a manual diagnosing section;

transmitting diagnosis result information, obtained as a result of the diagnosing, to the client corporation through the line; and

planning a production of the machine component using a diagnosis result utilizing production planning support unit utilizing the diagnosis result information.

47. (Previously Presented) A machine component monitoring and diagnosing method monitoring, diagnosing, and selling a machine component having rolling elements, which method comprises, at a business establishment of a corporation manufacturing and selling the machine component:

receiving through a line, information detected by a sensor detecting a factor associated with a lifetime of a machine component, incorporated in a machine used by a client corporation at a remote location;

diagnosing a status of lifetime of the machine component based on the received sensor information by using an examining section and a manual diagnosing section;

generating merchandise information associated with the diagnosed machine component in accordance with diagnosis result information obtained as a result of the diagnosing, and transmitting the diagnosis result information, together with the merchandise information to the client corporation, through the line; and

planning a production of the machine component using a diagnosis result utilizing production planning support unit utilizing the diagnosis result information.

48. (Previously Presented) A system, comprising:

a sensor sensing a factor associated with a lifetime of a machine component incorporated in a client's machine, said machine having rolling elements;

a sensor information transmitting unit transmitting sensed information to a manufacturer of the machine component;

a diagnosing unit using the sensed information to diagnose a state of the machine component and estimate a remaining life of the machine component, said diagnosing unit having an automated examining section and a manual diagnosing section;

a merchandise information adding unit generating and adding merchandise information associated with the diagnosed machine component in accordance with diagnosis result information of the diagnosing unit

a diagnosis result information transmitting unit transmitting the merchandise information and the diagnosis result information to the client; and

a diagnosis result utilizing production planning support unit utilizing the diagnosis result of the diagnosing unit to plan a production of the machine component.

49. (New) A machine component monitoring system monitoring machine components used in a machine system, a plurality of said machine components each having rolling elements, said machine component monitoring system comprising:

a control unit;

a plurality of determining units, electrically connected, respectively, with a plurality of sensors, said determining units being electrically connected with the control unit, each of the sensors being arranged on the respective machine component and detecting an influence signal induced in the machine component and resulting from passage of the rolling elements, each of the determining units determining, according to a predetermined process set-up condition, a status of the respective machine component, said status being at least one of presence of an abnormality, absence of an abnormality, and lifetime of the respective machine component, in reference to an output signal from the respective sensor; and

said control unit collecting results of determination performed by each of the determining units,

wherein when determining the status, each determining unit determines one of a presence of an abnormality and an absence of an abnormality in a sensor waveform, which is the output signal from the associated sensor, and

each of the determining units compares sensor waveform main signal cycles of the plural sensors connected therewith, and in the event that the main signal cycle is not found within a predefined range, determines the presence of a rotation abnormality as the abnormality in the sensor waveform.

50. (New) A machine component monitoring system monitoring machine components used in a machine system, a plurality of said machine components each having rolling elements, said machine component monitoring system comprising:

a control unit;

a plurality of determining units, electrically connected, respectively, with a plurality of sensors, said determining units being electrically connected with the control unit, each of the sensors being arranged on the respective machine component and detecting an influence signal induced in the machine component and resulting from passage of the rolling elements, each of the determining units determining, according to a predetermined process set-up condition, a status of the respective machine component, said status being at least one of presence of an abnormality, absence of an abnormality, and lifetime of the respective machine component, in reference to an output signal from the respective sensor; and

said control unit collecting results of determination performed by each of the determining units,

wherein when determining the status, each determining unit determines one of a presence of an abnormality and an absence of an abnormality in a sensor waveform, which is the output signal from the associated sensor, and

wiring used to connect the determining units and the associated sensors is a sheathed sensor cable having a sheath that is water proof, dust proof, rust proof, and moisture proof, and resists oil, heat, and electromagnetic noise.

51. (New) A machine component monitoring system monitoring machine components used in a machine system, a plurality of said machine components each having rolling elements, said machine component monitoring system comprising:

a control unit;

a plurality of determining units, electrically connected, respectively, with a plurality of sensors, said determining units being electrically connected with the control unit, each of the sensors being arranged on the respective machine component and detecting an influence signal induced in the machine component and resulting from passage of the rolling elements, each of the determining units determining, according to a predetermined process set-up condition, a status of the respective machine component, said status being at least one of presence of an abnormality, absence of an abnormality, and lifetime of the respective machine component, in reference to an output signal from the respective sensor; and

said control unit collecting results of determination performed by each of the determining units,

wherein when determining the status, each determining unit determines one of a presence of an abnormality and an absence of an abnormality in a sensor waveform, which is the output signal from the associated sensor,

each of the determining units has a relay terminal, and

the determining units are sequentially wired together through the respective relay terminals.

52. (New) A machine component monitoring system monitoring machine components used in a machine system, a plurality of said machine components each having rolling elements, said machine component monitoring system comprising:

a control unit;

a plurality of determining units, electrically connected, respectively, with a plurality of sensors, said determining units being electrically connected with the control unit, each of the sensors being arranged on the respective machine component and detecting an influence signal induced in the machine component and resulting from passage of the rolling elements, each of the determining units determining, according to a predetermined process set-up condition, a status of the respective machine component, said status being at least one of presence of an abnormality, absence of an abnormality, and lifetime of the respective machine component, in reference to an output signal from the respective sensor; and

said control unit collecting results of determination performed by each of the determining units,

wherein when determining the status, each determining unit determines one of a presence of an abnormality and an absence of an abnormality in a sensor waveform, which is the output signal from the associated sensor, and

the machine system is an aggregation of a plurality of machine system constituent elements, each including the plural machine components, and wherein each of the determining units is used one for each of the machine system constituent elements and the sensor connected with each of the determining units is arranged on the machine component provided in one of the machine system constituent elements that is associated with such determining unit.